Handbook for Designing a Usable Web Site

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INTRODUCTION

Have you ever...

- Been lost in a web site?
- Left a site before finding the information you wanted?
- Waited too long for a page to download?
- Gone to a site you can't view or read?
- Visited a site with outdated information?

All of these are signs that the web site you are visiting could better suit you, the user. When it's your site, if the visiting users don't need the information provided, they may not return if your site is not easy to use. If you want people to visit and return to your site, you should invest in making your site highly usable.

What is Usability?

Usability is the degree to which a user can complete tasks effectively and efficiently. A usable system is one that meets the needs of the user. Usability is concerned with:

- Functionality/usefulness
- Ease of learning
- Ease of use
- Aesthetics
- User satisfaction
- Quality

Usability of "Everyday" Objects

It may help to understand what we mean by usability by looking at common objects. Usability isn't just related to computer systems. Every object you use has some degree of usability. Some objects are highly usable and others are not. For example, how often have you pushed a door to open it when you were supposed to pull it to open it? The design of that door affects whether you know intuitively whether to push or pull. For more examples of usability and common objects see http://www.baddesigns.com or read *The Design of Everyday Things*, by Donald Norman.

Top Mistakes

Some of the top mistakes that contribute to usability problems in web sites include:

- Not knowing why you have a web site
- Designing for your own VPs
- Letting the site structure mirror your organization chart
- Not linking to associated information
- Adding features because you can, not because they add value (e.g., animation)
- Forgetting to budget for maintenance

Development Method

Many design mistakes can be avoided by following a good development method for web pages and following web guidelines. A good development method includes:

- Planning
- Design
- Implementation
- Evaluation
- Maintenance

These activities are best done in an iterative fashion.

This handbook explains these activities and provides guidelines to help you achieve a well-designed, highly usable web site. To make this handbook small and manageable (i.e., usable), topics are briefly discussed and references are provided so that you can get further information on the details of those topics.

PLANNING

You can use an eraser on the drafting table or
a sledge hammer on the construction site."
- Frank Lloyd Wright

Planning is probably the most important step in building a new product. You need to understand many things, such as what you are building, why you are building it, for whom you are building it, and how they will use it. Having a well thought out plan will save time and money during development because changes are much easier made at the planning stage than at later stages.

Planning Activities

The activities to be carried out in the planning stage of a web site include:

- Identify the purpose of the web site
- Identify target users
- Define the user tasks
- Determine scope, usage, and change characteristics of the information
- Define the "personality" of your site
- Put together your web site team

Identify a Purpose

Many web sites are created without a clear purpose. People create web sites because "everybody else has one," or "it's cool," or "it would be fun to do." Before creating a web site, you should ask yourself "what will be gained by having a web site?"

To define a purpose for your web site, first look at the goals of your organization. Then decide which goals the web is suited to meet. While you may have more than one goal for your web site, you should prioritize the goals, having one primary goal and one or more secondary goals.

The purpose of the web site could be to:

- Share information
- Communicate and collaborate
- Sell your product or service
- Entertain
- Anything you imagine!

Identify Target Users

While "anyone" can come to your site, you want to determine which users you want to target. These are the users who you want to visit your site to help you meet the primary goal of your site. Once again, prioritize your target users so that you can focus on the primary users who will help you achieve your primary goals. Examples of target users are domain experts, internal employees, teachers, and students.

Next you want to learn as much as you can about the characteristics of your users. Characteristics to list include age, computer literacy, domain knowledge, access methods, browsers, work

environments, and handicaps. This information can be collected through surveys, questionnaires, and actual visits to your users in their environments.

Define User Tasks

Now that you know what your goals are for your site and who you want to visit it, you need to know what will attract these users to your site. Why will users come to your site?

What's in it for them? The best way to find out is to talk to them! If they currently come to your site, find out why they come and what they want to do at your site. Some example user tasks include:

- Find information about a particular product
- Learn about new projects
- Purchase a product
- Find out about future presentations
- Download copy of a document
- Contact organization employees
- Provide feedback

Create Scenarios

From these task descriptions you can create use scenarios to help drive your design. These scenarios reflect what a user may do during one visit to your site. They try to capture a moment in time for the user. Many scenarios can be developed for each type of user. By having these scenarios, the flow through your site can be created to accommodate the users' goals.

A sample scenario might be the following:

> John Doe is working at the IRS struggling to make their systems more user friendly. He remembers that someone at Goddard is involved with usability engineering and wants to contact that person, either by phone or e-mail, for more information about usability engineering in a government bureaucracy.

So John's task is to find the name and contact information for someone at Goddard who knows about usability engineering. How easy is that to do?

Determine the Scope and Organization of Information

Once you know why you are developing a web site, who your users are, and how they will use the site, you can determine what information you need to have on your site and how to organize it.

Use these steps:

- First look at what information your users need to complete their tasks.
- Next look at what additional information you want to provide to meet your goals for the site.
- Finally, decide how this information should be organized.

Organizing the information is one of the most challenging aspects of web design. You should consider the user's needs when organizing information. Consider in what order the users will need

information to complete their tasks. Where possible, use familiar organizational schemes. Also, use terminology that is familiar to the user.

Consider having your users organize the information for you. A method called card sorting is one way to assist you in this task. In brief, card sorting requires a group of users and involves the following activities:

- Provide an identical set of index cards to each user. Each card has one piece of information about your site on it.
- Have each person (user) sort the cards into logical groups.
- Have the users work independently and in silence.
- Provide blank cards to the users. Users can duplicate a card if they think it belongs in more then one group. Users can add cards if they think information is missing.
- Have users name the groups.

There are no wrong answers using this method, and you may find that different users will organize the information in different ways. Once the silent activity is complete, find the similarities among the organizational schemes, or have the users explain why they organized the information in that way. For more information on the Card Sorting technique, see http://www.usableweb.com

Keep the Information Up-to-Date

One of the big problems with information on the web is that is tends to get outdated. To avoid this problem, have a plan from the start of how you will keep the information up-to-date. Determine how often the information is likely to change and need updating. Assign a person or persons to be responsible for getting the new information and updating the web site. Have a plan for ensuring that the information is actually updated in a timely and accurate fashion. See the section on Maintenance.

Determine a Personality for Your Site

The personality of your site is determined by several factors, including the writing style that is used, the font, graphics, colors, and layout of the site. Your personality should be consistent with the content of the information at the site, as well as the image of your organization you would like to reflect. For example, you don’t want a "fun" or "silly" personality reflected in the design of a site for a memorial of a tragic event.

To determine a personality for your site, do the following:

- List adjectives to describe your site (e.g., fun, informative, efficient, accurate, trustworthy, up-to-date, authoritarian)
- Ask your target users to do the same.
- See if there is overlap.

A good graphic designer should be able to take your adjectives and tailor the design to reflect the personality you want. Just be careful, although you may want a "fun" site, your users may be interested in an efficient and reliable site. Don’t turn your users away by ignoring their desires. For more information on graphic design see
http://aaaprod.gsfc.nasa.gov/teas/SabiaTEA/GraphicDesignUsabilityV20/GraphicDesignUsabilityV20/i

Define Your Development Team

Many organizations hire a "webmaster" to be solely responsible for the organization's web site. This is not the best approach. Many different skills are needed to create a great web site. A good cross-disciplinary team includes:

- Project manager (web site manager)
- HTML authors
- Programmers
- Interface and interaction designer
- Graphic designer
- Human factors/ usability expert
- Writers
- Content owners
- Client/customer
- User
- System/server administrator
- Representative from a legal department
- Security

One person on your team can fill multiple roles, but you should make sure each role is assigned to someone on your team. Also notice that "user" is one of the people who should be on your team. To have a successful web site, you need to understand your users so that the design meets their needs.

Challenges in Planning Your Web Site

There are many challenges in planning your web site. Some are found in any team organization such as:

- Poorly defined and overlapping roles and responsibilities of team members
- Coming to consensus

Other challenges are more closely related to the technology, such as:

- Including irrelevant information (feature creep)
- Desire for "coolness"
- Adding features because you can, not because they enhance your site

Having a well-defined team and staying focused on your goals and users should help in overcoming these challenges.

DESIGN

"Any object or element of the interface that does not add to communication

is subtracting from it."

-Bruce Tognazzini

Before you start to develop, you should have a design in place. Because it is so easy to put up a web page, this step is often neglected. Creating a paper prototype of the web site is the best way to begin the design process. A web page can be mocked up as part of the design process, but the underlying code should not be added until the design is evaluated.

Consider several things in the design of your web site. Be aware that the web pages may be displayed differently depending on what platform (e.g., Mac, PC, Unix) your users have and also the browser they are using. Keep in mind the needs of the authors (those who will be updating the information on your site), as well as the users (those who read the information on your site). Also consider the following user behaviors; remember that users:

- Do not always start at your home page
- May be interested in only a small part of your Web site
- Scan the links first before deciding whether to read the entire page
- Find it harder to read text on-line
- Care about their time
- Don’t want to spend unnecessary effort
- Do get lost
- Do appreciate pages that are pleasing
- Do not have the same platform or the same browser
- Might have text-only browsers

For more discussion on web page design considerations, see Jakob Nielsen’s Alertbox column entitled "Top Ten Design Mistakes" found at http://www.useit.com/alertbox

Accessibility

One major consideration is how accessible your system is to the blind, deaf, and mobility impaired populations. In addition to the obvious members of these groups, consider the elderly, young, and those with repetitive stress injuries. You could loose this segment of your user population if you do not consider their needs. For more information on accessibility issues in web design see http://www.w3.org/WAI/

Create a Design Style Guide

For a web development team involving more than one or two people, you need a way to coordinate the design and implementation so that the web site will have a coherent, consistent look and feel. A good way to do this is to have a design style guide. The design style guide contains guidelines for a consistent look and feel and site navigation experience.

The key to a successful design style guide is making the details simple, understandable, and easy to implement.

A style guide should include:

- Overall navigation and organization description
- Templates for each "page type"
- Guidelines for adding content

- Guidelines for removing/archiving content
- Presentation guidelines (e.g., color schemes)
- Approval and workflow checklists

How do you create a style guide?

- Start with a general, high-level style guide or a web style guide from another project (several are listed in the appendix).
- Tailor it to your project by removing and adding various guidelines. For instance, you may want to change the font specified in the guidelines to match the personality of your site.
- Make it easy to use. Provide templates, common graphics, and other elements in a place that it is easy to access them. Make the developer's job easier to use the templates than to start from scratch.
- Allow the guidelines to evolve as your system evolves.

IMPLEMENTATION

"The intelligent use of graphic elements and design can add greatly to the attractiveness of a web page. But it's like putting on makeup -- you have to know when to stop."
-Zen and the Art of Web Design

Design and implementation have many overlapping activities. As you implement, you may need to revisit your design and change it. As the web technology changes, you may need to change your design to use the new technologies that will benefit your web site. The whole development process is an iterative process.

Web Design Guidelines

A few things you should know about Guidelines.

Guidelines are a way to make your site consistent.

> If you create a set of guidelines and a style guide for your web site, then it is more likely that your site will look like one coherent site rather than a collection of unrelated pages. It also will let the user recognize whether they are still at your site or if they have left your site.

Guidelines come from past experience and studies

> Many companies and universities conduct studies and research to analyze what designs are easiest for user to understand and use. By following the guidelines they produce, you can benefit from their efforts without having to expend the effort yourself.

Guidelines are not hard and fast rules and may be broken.

> Understand the reasons behind the guidelines and then you will know when you can deviate from them.

Guidelines can be changed when warranted.

As new technologies emerge, the guidelines most likely will need to be changed. As your user population changes, the guidelines may also need to be changed.

Several web style guides are available on the web that list and explain guidelines for good design. Those style guides include the following:

Ameritech Web Page user Interface and Design Guidelines:
http://www.ameritech.com/corporate/testtown/library/standard/web_guidelines/index.html

Apple Web Design Guide
http://www.applenet.apple.com/hi/web/intro.html

Sun Microsystems: Guide to Web Style
http://www.sun.com/styleguide/

Yale C/AIM Web Style Guide
http://info.med.yale.edu/caim/manual/contents.html

IBM Web Design Guidelines
http://www.ibm.com/ibm/hci/guidelines/web/web_design.html

EVALUATION

"If the user can't find it, the function's not there!"
- Human Factors International

Having a user on your development team or getting to know your users and their needs is the first step in making sure your site meets their needs. Having this information is not enough, though. You also need to evaluate your design with the users once it is defined to verify that it meets your purpose and that your users can use it successfully.

Evaluations are best done early in the design cycle and often throughout development. You do not have to wait for the finished product to evaluate the design with the user. Evaluations can be done on simple paper prototypes. It is much easier to change a design early in the process when it is just a paper prototype than to change it once it is complete and due for immediate release.

To ensure that your web site looks good and functions well with different user setups, test:

- With different Web browsers
- On different platforms
- On different monitor sizes (13-17 in. laptops), resolutions, and color bit-depth (256)
- With images turned off
- At different connection speeds
- At expected peak usage

Use automated checkers, such as those listed in the appendix.

Usability Testing

Usability testing is a way to evaluate the interface with real users. You can test in a lab or in the user's environment. The test can be performed on paper prototypes as well as on implemented systems.

Basically, usability testing involves giving users representative tasks to complete and watching for where the interface does not support their task completion. The usability engineer then identifies changes to be made to the interface to support the user. For more information on usability testing see the Usability Testing Handbook available at: http://aaaprod/usability/use/

For a web site, users often are not available at your location. They may be using your site from another state or country. You don't need to be with the users to have them evaluate the system. Often, a speakerphone is enough to get their comments while they are performing your predefined tasks. Several software tools are available that allow you to see user's navigation behavior remotely. For more information on remote usability testing see: http://hci.ise.vt.edu/~josec/remote eval/

In addition to testing, use on-line usability questionnaires to get feedback after your site is operational.

MAINTENANCE

"Your annual maintenance budget should be as big as the original development budget."

The maintenance of the web site is one job that is usually overlooked. Creating a new web site can be exciting, where as the maintenance portion is not quite so exciting. But web users expect the information they receive to be up-to-date. If your site is notoriously out of date, the users will stop visiting it. Make sure someone keeps up with the following maintenance activities:

- Update content as promised
- Revise web site based on feedback
- Identify "new" content
- Check web site integrity (e.g., dead links, current information, etc.)
- Monitor web site usage statistics
- Look at the terms people use when searching for information at your web site
- Use site management tools for effective management of your web site

The web technologies are constantly being refined and improved and new technologies are being introduced. It is important to continue to learn about the new technologies. But, don't automatically use a technology just because it is "the latest and greatest." Before using it, evaluate the technology for the benefit it will provide to your site. Also, wait until new technology is stable and compatible with all browsers that your users use.

SUMMARY

"One only has to sit in virtually any of the "real cool" chairs built in the last fifty years by leading Bauhaus designers to understand why: What looks "real cool" can often be acutely painful to use. First the interface should communicate; only then should it look 'real cool'."
-Bruce Tognazzini from TOG on Interface

Web sites can be created quickly by just about anyone as is evidenced by the number of web sites in existence. But good web sites are few and far between. Creating a good web site involves planning, design, evaluation, and maintenance -- steps often overlooked by those who just want to implement. By following the approach described in this handbook, you can create a useful web site that benefits both you and your users.

Remember:

- Have a goal or purpose for your site.
- Spend time in planning and design.
- Know your users.
- Don't do things because you can; do them because they add value.
- Continually evaluate and update your site.

RESOURCES

Available at Goddard

Usability Engineering Center (UEC) / Code 588

Assist and educate on usability engineering methods

Contact: Dana Uehling, x6-3375, Dana.Uehling@gsfc.nasa.gov

http://aaaprod.gsfc.nasa.gov/usability

Technology Support Office (TSO) / Code 588

Develop web sites and web applications

Contact: Barbie Medina, (301) 286-4438, Barbie.Brown@gsfc.nasa.gov

Goddard Web Masters

General information, presentations, mailing list on Web-related topics, guidelines for NASA web sites, and other information. http://cne/web/webmasters.html

Available on the Web

On-line Web Design Style Guides

Ameritech Web Page User Interface and Design Guidelines:
http://www.ameritech.com/corporate/testtown/library/standard/web_guidelines/index.html.

Apple Web Design Guide
http://www.applenet.apple.com/hi/web/intro.html

Sun Microsystems: Guide to Web Style
http://www.sun.com/styleguide/

Yale C/AIM Web Style Guide
http://info.med.yale.edu/caim/manual/contents.html

IBM Web Design Guidelines
http://www.ibm.com/ibm/hci/guidelines/web/web_design.html

Usability-Related Web Sites

The Usability Professionals' Association. A collection of information on usability related topics
http://www.UPAssoc.org

The Alertbox: Current Issues in Web Usability. A bi-weekly column by Jakob Nielsen
http://www.useit.com/alertbox

User Interface Engineering. A company that specializes in Usability Engineering. Publishes information on what they have learned from their studies.
http://www.uie.com

Accessibility-Related Web Pages and Validators

The World Wide Web Consortium's site on accessibility
http://www.w3.org/WAI/

Bobby finds HTML compatibility problems that prevent web pages from being displayed on different web browsers:
http://www.cast.org/bobby/

How do you make a web page accessible?
http://www.psc-cfp.gc.ca/dmd/access/welcome1.htm

What does your page look like when viewed by Lynx?
http://www.miranova.com/~steve/Lynx-View.html

Web page backward compatibility viewer:
http://www.delorie.com/web/wpbcv.html

Other HTML checkers:
http://www.access2020.com/
http://ugweb.cs.ualberta.ca/~gerald/validate/

Other Web Sites

Art and the Zen of Web Sites:
http://www.tlc-systems.com/webtips.htm

The Usability Methods Toolbox:
http://www.best.com/~jthom/usability/usahome.htm

WWW Accessibility to People with Disabilities: A Usability Perspective:
http://www.staff.uiuc.edu/~jongund/access-overview.html